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PROJECT NO. 52373

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REVIEW OF WHOLESALE MARKET DESIGN	§	PUBLIC UTILITY COMMISSION OF TEXAS
	§	

**TEXAS PUBLIC POLICY FOUNDATION'S COMMENTS: EXECUTIVE SUMMARY**

- A full implementation of the second directive in Governor Abbott's July 6 letter, i.e. a firming requirement for generators that cannot guarantee their availability, is a necessary part of the market redesign process because the variability of wind and solar cannot be adequately addressed within the current market structure.
- When assessing the need for a firming requirement for variable generators, it is important to keep several facts and principles in mind:
  - Serving all ratepayers should be the primary purpose of electricity policy and market design. Electricity markets should not favor certain consumers or market participants.
  - The Texas model of socializing transmission and reliability costs among ratepayers provides generators with an implicit subsidy and favors generators that impose more transmission and reliability costs on the system.
  - Failing to allocate reliability costs to variable generators will result in increasing costs for backup power and/or in more frequent reliability problems. Texas is experiencing a combination of both conditions, and neither outcome is optimal for consumers.
  - Allocating more of these system-level reliability costs to generators will bring more balance to the market and provide an incentive for generators to minimize those costs, thereby lowering the overall cost to ratepayers.
- Altering the current price structure is not sufficient when prices are distorted by federal subsidies and out-of-market investments in wind and solar.
- A new ancillary service is the most straightforward way to implement a firming requirement for variable generators and is, at the very least, an adequate near-term solution as broader changes to incentivize reliable generation are developed.
- The service should be procured seasonally for the summer and winter periods and should be sized according to the difference between their expected output during peak demand hours and their low 95<sup>th</sup> percentile output. This would bring the low-end variability of wind and solar generators in line with the variability of dispatchable generators.
- The cost of the service would likely be on the order of a few hundred million dollars annually, far less than the estimated \$2 billion incurred in 2019 due to the changes in the ORDC.
- Requiring all generators to bid into the day-ahead market is not adequate for addressing wind and solar intermittency. The problem with wind and solar is the vast uncertainty in the extent to which those resources will be available on the days of highest demand during each season. Firming is necessary to provide a buffer against this uncertainty.
- Similar market reforms to the proposed ancillary service could include allocating ORDC payments based on a generator's ability to guarantee its availability and creating a new reliability price adder for variable generators to capture the cost of backstopping those generators with dispatchable generation

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**TEXAS PUBLIC POLICY FOUNDATION'S COMMENTS**

TO THE HONORABLE PUBLIC UTILITY COMMISSION OF TEXAS:

The Texas Public Policy Foundation (TPPF), through its Life:Powered initiative, respectfully submits the following comments on Project No. 52373: Review of Wholesale Market Design.

**I. INTRODUCTION**

Among the many issues that need to be addressed in the market redesign plan, TPPF believes that particular attention should be paid to the second directive in Governor Abbott's July 6 letter<sup>1</sup>, namely to "Allocate reliability costs to generation resources that cannot guarantee their availability, such as wind and solar power." This directive is the subject of these comments and will be addressed in greater detail in a forthcoming TPPF publication<sup>2</sup>.

These comments will use the term "firming requirement" to refer to a requirement for variable generators to guarantee a minimum level of availability, either through procuring backup generation, demand response, or energy storage. When assessing the need for a firming requirement for variable generators, it is important to keep several facts and principles in mind:

1. Serving all ratepayers should be the primary purpose of electricity policy and market design. Electricity markets should not favor certain consumers or market participants.
2. The Texas model of socializing transmission and reliability costs among ratepayers provides generators with an implicit subsidy and favors generators that impose more transmission and reliability costs on the system.
3. Failing to allocate reliability costs to variable generators will result in increasing costs for backup power and/or in more frequent reliability problems. Texas is experiencing a combination of both conditions, and neither outcome is optimal for consumers.
4. Allocating more of these system-level reliability costs to generators will bring more balance to the market and provide an incentive for generators to minimize those costs, thereby lowering the overall cost to ratepayers.

Texas is already facing the problems involved in maintaining a dual system of intermittent generation and reliable backup power. As the annual share of generation from wind and solar has increased to

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<sup>1</sup> Greg Abbott, "Letter to the Commissioners of the Public Utility Commission of Texas," Office of the Texas Governor, July 6, 2021, [https://gov.texas.gov/uploads/files/press/SCAN\\_20210706130409.pdf](https://gov.texas.gov/uploads/files/press/SCAN_20210706130409.pdf).

<sup>2</sup> Brent Bennett, *Improving the Reliability of the ERCOT Grid Through a Firming Requirement for Wind and Solar Generation*, Texas Public Policy Foundation, upcoming October 2021.

almost 30%<sup>3</sup>, the existing gas, coal, and nuclear capacity, which is 93% of peak demand<sup>4</sup>, is barely sufficient. Previous modelling work from TPPF<sup>5</sup> predicts that a 50% wind and solar share for Texas would still require, at a bare minimum, 60 GW of dispatchable generation and 10 GW of energy storage.

**The market redesign plan must address two central questions: how much backup power is needed for a given level of variable generation and how to allocate the cost. Any market redesign must include a firming requirement because the variability of wind and solar cannot be adequately addressed within the current market structure.** TPPF agrees with Chairman Lake's comment in the July 13 Texas Senate Business and Commerce hearing that improving reliability will require more than tweaking around the edges of the existing ERCOT market structure<sup>6</sup>. As documented by the Independent Market Monitor<sup>7</sup> (IMM), ERCOT wholesale prices have been too low and volatile since at least 2014 to support significant investment in dispatchable generation. However, wind and solar generators have thrived in this volatile, low-price environment because their capital costs are subsidized by the federal government and tax equity investors and their marginal costs of production are minimal.

**Altering the current price structure is not sufficient when prices are distorted by federal subsidies and investors, municipal utilities, and large consumers are specifically looking to invest in wind and solar, even at a greater cost.** The only effect of increasing prices will be to drive more investment in wind and solar. Therefore, an alternative approach is needed that targets investment toward more reliable assets. These comments will focus on the approach that TPPF believes will be most effective, at least in the near term, which is to create a new ancillary service for variable generators to guarantee a minimum level of availability during both summer and winter peak demand hours. The pros and cons of other means of implementing a firming requirement will also be discussed.

## **II. An Ancillary Service for Variable Resources to Guarantee Firm Capacity**

The procurement of this ancillary service should be based on the amount of capacity necessary to enable wind and solar to produce their expected output with the same level of reliability as dispatchable resources over the peak-demand period. The ERCOT *2020 State of the Market Report* notes that the average outage rate for dispatchable resources was 5% during peak summer demand periods from 2017 to 2020<sup>8</sup>. Under this proposal, variable generators would be required to guarantee the same level of

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<sup>3</sup> See "Fuel Mix Report: 2021" in "Generation," ERCOT, accessed September 29, 2021, <http://www.ercot.com/gridinfo/generation>.

<sup>4</sup> "Seasonal Assessment of Resource Adequacy for the ERCOT Region (SARA) – Summer 2021," ERCOT, May 6, 2021, <http://www.ercot.com/content/wcm/lists/219840/SARA-FinalSummer2021.pdf>.

<sup>5</sup> Brent Bennett, *Green New Deal Will Put Texans in the Red: Effects on Texas Electricity Costs and Energy Production up to 2030*, Texas Public Policy Foundation, October 2019, <https://lifepowered.org/wp-content/uploads/2019/10/2019-08-PP-LP-Bennett-Green-New-Deal.pdf>.

<sup>6</sup> See committee hearing of July 13, 2021, on the implementation of SB 3 (87th Texas Legislature, first called session), Texas Senate Business & Commerce Committee, 1:36:30, [https://tlcsenate.granicus.com/MediaPlayer.php?view\\_id=49&clip\\_id=16367](https://tlcsenate.granicus.com/MediaPlayer.php?view_id=49&clip_id=16367).

<sup>7</sup> Potomac Economics, *2020 State of the Market Report for the ERCOT Electricity Markets*, May 2021, 72, 73, <https://www.potomaceconomics.com/wp-content/uploads/2021/06/2020-ERCOT-State-of-the-Market-Report.pdf>.

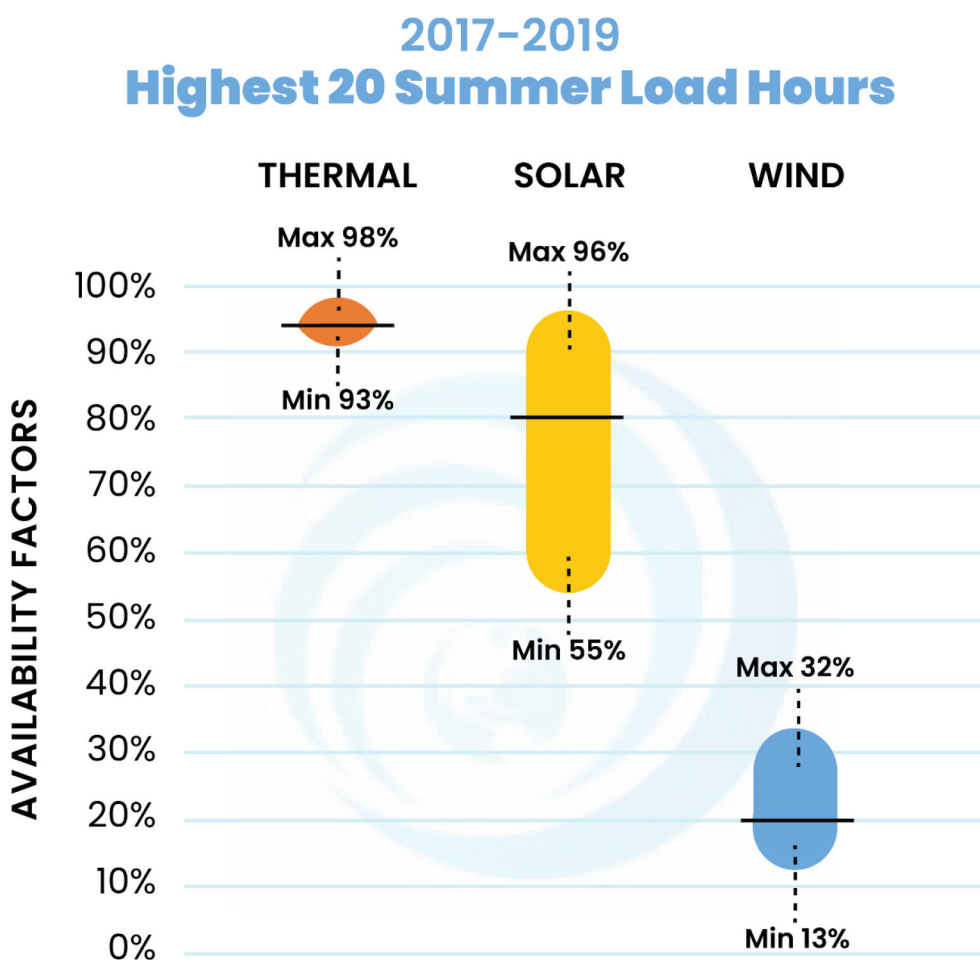
<sup>8</sup> Potomac Economics, *2020 State of the Market Report*, 84.

reliability as a dispatchable unit, for example, 95% of its expected output during the peak period. This proposal will cut down on the reliability deficit being imposed by variable generation and appropriately place the cost of the service on those resources instead of on ratepayers.

Wind and solar generators often produce 40% less than their expected output during peak periods. A comparison of the output of during the peak summer hours from 2017 to 2019 for thermal, wind, and solar generators is shown in Figure 1 below. A reserve margin of 10% to 15% is not adequate when a large portion of the resources may produce 40% less than their expected value. Yet, ERCOT continues to calculate its planning reserve margin using the average output of wind and solar during peak periods and claims reserves are adequate. Only by reducing the volatility of wind and solar to 5% with firming can the ERCOT market operate reliably with a 10% to 15% reserve margin.

**Figure 1**

*Distribution of Wind, Solar, and Thermal Output in ERCOT During Peak-Demand Hours, 2017-2019*



*Note.* Thermal data from ERCOT (proprietary). Wind and solar data from *Resource Adequacy*, “Wind Profiles, Operational-Planned, 1980-2019” and “Solar PV Profiles, 1980-2019,” ERCOT, 2021 (<http://www.ercot.com/gridinfo/resource>).

The size of the firming service should be calculated based on the aggregate output of wind and solar in generation ERCOT, taking into account the advantages of resource diversity. Applying ERCOT's methodology (average of the top 20 peak hours per year) to the peak summer hours from 2015 to 2019, the expected peak summer output would be 30% of installed wind and solar capacity<sup>9</sup>. But the 95% confidence level is only 18% of peak capacity. The service would require wind and solar generators in aggregate to purchase firming assets equal to 12% (30%–18%) of their installed capacity on a year-ahead basis for the peak hours of the summer. This procurement will ensure that their variability—that is, their low output relative to their expected output—is not more than that of other generation assets. A similar process could be used for peak winter hours.

The economic cost of this firming service would be considerably less than the estimated \$2 billion in costs incurred in 2019 from the alteration of the Operating Reserve Demand Curve (ORDC)<sup>10</sup>. In 2020, ERCOT had 28,941 MW of wind and solar capacity<sup>11</sup>. A firming service of 12% of installed capacity would equate to a procurement of 3,473 MW of capacity from other sources. The IMM estimates the cost of new entry for a gas combustion turbine at a minimum of ~\$95/KW-year<sup>12</sup>, which results in an annual cost of the ancillary service of approximately \$330 million. In 2020, wind and solar facilities produced 95.8 million MWh<sup>13</sup>, so the cost would be \$3.45/MWh on average. Wind and solar installed capacity grew to 39,656 MW in the summer of 2021<sup>14</sup>, which would equate to a firming requirement of 4,758 MW at an annual cost of about \$450 million.

The duration of the ancillary service is also an important consideration. Each summer, the 20 peak-demand hours almost always occur between 2 p.m. and 7 p.m., with a normal distribution about the 4 p.m. hour<sup>15</sup>. Therefore, the period for the summer ancillary service could be defined as the 5 hours from 2 p.m. to 7 p.m. Any resource used for firming would have to be able to operate continuously throughout that entire period. Winter storms tend to produce longer periods of high demand, but that level of demand is not usually as high as in the summer (with the obvious exception of Winter Storm Uri). Therefore, the winter firming requirement might be for a lower capacity value over a longer period, probably 24 hours or more.

As the penetration of wind and solar generation grows, it will likely be necessary for the PUC to increase the size and duration of the firming requirement beyond the expected output during peak hours to ensure reliability. For example, previous modeling from TPPF indicates that 80% or greater wind and solar penetration would likely require twice as much combined wind and solar capacity as peak

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<sup>9</sup> See "Wind Profiles, Operational-Planned, 1980-2019" and "Solar PV Profiles, 1980-2019" in "Resource Adequacy," ERCOT, accessed September 29, 2021, <http://www.ercot.com/gridinfo/resource>.

<sup>10</sup> Potomac Economics, *2020 State of the Market Report*, 80.

<sup>11</sup> *Report on the Capacity, Demand and Reserves (CDR) in the ERCOT Region, 2021-2030*, ERCOT, December 16, 2020, [http://www.ercot.com/content/wcm/lists/197379/CapacityDemandandReservesReport\\_Dec2020.pdf](http://www.ercot.com/content/wcm/lists/197379/CapacityDemandandReservesReport_Dec2020.pdf).

<sup>12</sup> Potomac Economics, *2020 State of the Market Report*, 72, 73.

<sup>13</sup> See "Fuel Mix Report: 2007-2020" in "Generation," ERCOT, accessed September 29, 2021, <http://www.ercot.com/gridinfo/generation>.

<sup>14</sup> "Seasonal Assessment of Resource Adequacy for the ERCOT Region (SARA) – Summer 2021,"

<sup>15</sup> See 2015 to 2019 ERCOT Hourly Load Data in "Hourly Load Data Archives," ERCOT, accessed September 29, 2021, [http://www.ercot.com/gridinfo/load/load\\_hist](http://www.ercot.com/gridinfo/load/load_hist).

demand<sup>16</sup>, which would in turn require firming to 50% of installed capacity instead of 30% and a much longer duration for the requirement.

### III. Other Options for Implementing a Firming Requirement

In the PUC's August 2 questions for comment, question 2 specifically contemplates the idea of requiring "all generation resources to offer a commitment in the day-ahead market as a precondition for participating in the energy market."<sup>17</sup> TPPF does not believe this approach is adequate for addressing wind and solar intermittency.

**The primary challenge with wind and solar intermittency is not the difference between day-ahead forecasts and real-time performance, which is normally small. The problem is that it is impossible to predict months in advance how well wind and solar will perform on the days of highest demand.** The difference between 13 GW and 3 GW of wind output on high demand days can be the difference between normal conditions with prices below \$100/MWh and rolling outages with prices at the \$9000/MWh cap. Generators do not have any certainty as to when and to what extent scarcity prices will be realized. This extreme price uncertainty is also why changing the existing scarcity price structure is inadequate for ensuring reliability during peak demand periods.

One improvement to the existing market structure would be to allocate ORDC payments based on a generator's ability to guarantee its availability. This change makes sense in that the ORDC is designed to incentivize investment in operating reserves, not the as-available energy from wind and solar generation. Such a change may be merited as an efficient way to direct investment toward more reliable generators. However, it does not guarantee of a certain level of backup power on days of low wind and solar generation, which the proposed ancillary service would provide. It would also fail to address the problem of uncertainty around when ORDC payments would be realized and might complicate many energy transactions with a two-tiered payout structure.

The Commission could also create a new reliability price adder for variable generators to capture the cost of backstopping those generators with dispatchable generation. The price could be determined by calculating the difference in the Reliability Deployment Price Adder for a given amount of uncertainty in wind and solar output, for example, between the 50<sup>th</sup> percentile and the low 95<sup>th</sup> percentile. While this method would still not guarantee a certain amount of backup power and might be more complex to implement than a firming ancillary service, it might be a more flexible and efficient mechanism for determining the appropriate size of the firming requirement compared to having the Commission set a fixed value each year. The adder would also provide a price signal for variable generators to firm up their output through the procurement of energy storage, demand response, or backup generation.

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<sup>16</sup> Bennett, *Green New Deal*.

<sup>17</sup> Connie Corona, "Memorandum Re: Project No. 52268 - Calendar Year 2021 - Workshop Agenda Items Without an Associated Control Number and Project No. 52313 - Review of Wholesale Electric Market Design," Public Utility Commission of Texas, August 2, 2021, [https://interchange.puc.texas.gov/Documents/52373\\_2\\_1144518.PDF](https://interchange.puc.texas.gov/Documents/52373_2_1144518.PDF)

#### IV. Conclusion

TPPF appreciates the Commission's extensive efforts to implement the market reforms requested by the Texas Legislature and Governor Abbott. With the expected continuation and expansion of federal subsidies and other out-of-market incentives for wind and solar generation, the problem of variable generation in Texas will only grow over the course of the coming decade. TPPF respectfully requests the Commission's consideration of this firming requirement proposal and looks forward to further engagement on other aspects of the market reform process.

Sincerely,

/s/ Jason Isaac

Hon. Jason Isaac

Director, Life:Powered

Texas Public Policy Foundation